

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

SEPTEMBER 2008 REPORT

Note to Readers: Pages 1-17 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 18.

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Item 1. UN General Assembly Stressed Environment-related Issues

The issues most frequently mentioned by heads of state and governments at the 63rd session of the UN General Assembly were the global food crisis, impacts of climate change, widespread hunger and poverty, access to water, nuclear control and disarmament, human rights, and terrorism. Ukraine suggested the development of a World Environmental Constitution as a binding framework agreement, and the establishment of a UN entity with authority for ecological protection. Mexico proposed a UN-managed Green Fund to help poor nations cope with the effects of climate change. Small island developing nations that are under imminent threat due to rising sea levels appealed for measures to ensure their survival and the Pacific Islands Forum will resubmit a resolution asking the Security Council to investigate the peace and security implications of global warming, although Solomon Islands' Prime Minister Derek Sikua expressed fears that the magnitude of climate change has already outgrown the existing capacity of the UN system to respond.

Military Implications:

These speeches reinforce the need to continue to develop the military's policies, plans and systems to anticipate and respond to new forms of security threats, environmental refugees from sea level rising, to increasing natural disasters. Overseas military commanders should be aware of the key themes of speeches given by their respective host heads of state at this session of the UN.

Sources:

General Debate of the 63rd Session (23 September - 1 October 2008)

<http://www.un.org/ga/63/generaldebate/>

Small Islands to World: S.O.S.

http://www.avaaz.org/en/sos_small_islands/

Item 2. UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System

The First Regional Meeting on Enhancing International Humanitarian Partnerships for Latin America and the Caribbean was held in Mexico City, September 10-11, hosted by the Government of Mexico in collaboration with the Government of Canada and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Participants explored how to improve disaster preparedness and response information and coordination systems among national and regional governments and relief organizations. As a first step, it is "essential to establish the basic compatibility of national response systems with the international system, tools and mechanisms," said John Holmes, Under-Secretary-General for Humanitarian Affairs and UN Emergency Relief Coordinator. The next regional meeting will be held in Brazil, in 2009.

Military Implications:

As part of its actions for addressing security in the region, the military with responsibility in Latin American and the Caribbean (USSOUTHCOM) should (if not already doing so) explore improvements for cooperation with these international, national, and regional organizations to address disaster preparedness and response—not only to help these organizations, but also to improve military relief actions, and seek participation in the 2009 Brazil meeting.

Sources:

UN Aid Chief Urges More Coordinated Disaster Relief in Latin America, Caribbean

<http://www.un.org/apps/news/story.asp?NewsID=28031&Cr=Caribbean&Cr1=Hurricane>

First Regional Meeting on Enhancing International Humanitarian Partnerships Concludes

<http://ochaonline.un.org/OchaLinkClick.aspx?link=ocha&docId=1094144>

USSOUTHCOM

<http://www.southcom.mil/AppsSC/index.php>

Item 3. First EU-Central Asia Security Forum Included Environmental Security

The aim of the first EU-Central Asia Security Forum was to consolidate relations between the EU and the Central Asian governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, as envisioned in the EU Strategy for Central Asia. This EU strategy focuses on terrorism, non-proliferation, human and drug trafficking, and energy and environmental security. The EU will help with financing and expertise for curbing illegal traffic of people, arms and drugs, while common energy security issues would be addressed by building infrastructure, including the Nabucco pipeline. The meeting was held in Paris, September 18, and attended by foreign ministers from the Central Asian countries and the EU member states and candidate countries, EU dignitaries, and experts from other organizations. Afghanistan observed. Participants agreed to have “regular exchanges” on these security risks.

Military Implications:

If not already involved in this process, the military should consider collaboration with these EU-Central Asia efforts for applications of the *Army Strategy for the Environment*, and early warnings of new regulations and other requirements in the region.

Sources:

Paris Hosts First EU-Central Asia Security Forum

<http://www.dw-world.de/dw/article/0,2144,3652594,00.html>

Human rights take back seat at EU-Central Asia talks

<http://euobserver.com/9/26778/?rk=1>

Item 4. Indonesian Navy to Tighten Security in Sea Border Areas

The Indonesian Navy announced that it will tighten security in its eastern and western sea border areas to support law enforcement efforts at sea for reducing illegal activities such as environmental pollution, smuggling, and even manipulation of shipping documents. Their law enforcement efforts will include prosecution and monitoring cases until sanctions are applied.

Military Implications:

The Navy and other military stationed in the area (e.g. the COMLOG WESTPAC) should explore options to support the Indonesian Navy with these law enforcement efforts.

Sources:

Indonesian Navy To Tighten Security In Border Areas

<http://www.bernama.com/bernama/v5/newsgeneral.php?id=359652>

CENTRIXS Online for CARAT and Naval Engagement Activity
http://www.navy.mil/search/display.asp?story_id=39075

COMLOG WESTPAC
<http://www.clwp.navy.mil/>

Item 5. NASA-Like Agency to Achieve a 10-Year Environmental Goal Proposed

An international expert meeting on worst-case scenarios for global warming held at the Foundation for the Future near Seattle, Washington, proposed the creation of a NASA-like U.S. agency to achieve a 10-year environmental goal. A lobby, independent from the foundation, is being created, composed of environmental leaders, aerospace engineers, and business executives (working title is the American Climate Alliance) to get the US Congress to create the agency by 2010 that would reach the goal by 2020.

Military Implications:

As there were relations between NASA's Apollo program and DOD, there would be relations between any R&D climate change agency and DOD. Hence, the military should monitor the development of the American Climate Alliance and contact the organization as appropriate at the email address below.

Source:

Meetings and email correspondence with Millennium Project staff Jerome Glenn (jgenn@ig.org) and Robert Citron (bobcitron@mac.com)

Item 6. Nationwide Health Information Network Could Help in Environmental Emergencies

According to information from Indiana University, "Investigators from the Regenstrief Institute [on the campus of Indiana University's School of Medicine in Indianapolis] have led a demonstration of how health information exchange technologies developed and tested regionally can be used to securely share patient information across the nation during an emergency." The demo was based on the HHS-supported trial implementation of a Nationwide Health Information Network (NHIN).

Military Implications:

Military personnel concerned with measures for handling environmental emergencies with health components should familiarize themselves with this work in order to take its capabilities into account in their planning.

Source:

A look to the future
<http://www.physorg.com/news141397611.html>

Item 7 Conference on Resilience Concepts for Large-Scale Disasters

Applications of chaos theory, self-organization, wisdom of the crowds, and other concepts of how to achieve unity of effort in conditions where there is no unity of command in humanitarian assistance and disaster management associated with large-scale social crisis and global change will be discussed at the U.S. Resilience Summit 2008 to be held at the Cosmos Club, 2121 Massachusetts Ave, N.W., Washington, D.C. October 23rd. The meeting is intended to lead to an international summit in 2009; however, some UN and other international participation is expected. According to Michael D. McDonald, President, Global Health Initiatives, Inc. and coordinator for the Resilience Summit, lessons will be drawn from disasters such as Hurricanes Katrina and Ike, the Pakistani earthquake, the Indian Ocean Basin Tsunami, and Cyclone Nargis. Anticipating needs for emerging situations such as in the Philippines, North Korea, Darfur, Somalia, Zimbabwe, Eritrea, Northern Baja California, Nigeria, Mexico City, and US inner cities will also be explored.

Military Implications:

Representatives from the Office of the Secretary of Defense and the National Defense University are already involved in planning the meeting; however, representatives from the Army Environmental Policy Institute and those they recommend should consider participating in the conference.

Sources:

2008 U.S. Resilience Summit (See meeting announcement in the [Appendix](#))

Meetings and correspondence with Michael.D.McDonald@mac.com and Millennium Project Director, Jerome Glenn (jglenn@igc.org)

Item 8. Technological Advances with Environmental Security Implications

8.1 New Detection and Cleanup Techniques

8.1.1 Fluorescent Sensor Bacteria Offer Fast Pollutant Detection

Jan Van der Meer, an environmental microbiologist at the University of Lausanne, Switzerland, and his team have announced successful results in their testing of sensor bacteria that release an enzyme in response to a given chemical and that have been genetically engineered so that that release also produces a protein that fluoresces in a particular color. Trials were conducted by testing ocean water for pollution from a simulated oil spill. Results could be obtained in a matter of minutes, as compared to the weeks needed for conventional chemical analysis. The bacteria's self-reproduction eases the task of supplying test material.

Military Implications:

The military should follow this development as a possible tool for battlefield and environmental contaminant detection systems.

Source:

Detecting Pollution with Living Biosensors

<http://www.technologyreview.com/Energy/21383/page1/>

8.1.2 DNA Spotted Microarrays Provide Faster Pathogen Identification

Prof. Sanjeev Narayanan, of the Dept. of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine at Kansas State Univ., and his colleague, Greg Peterson, reported having developed a DNA spotted microarray that finds the specific genetic markers that distinguish one pathogen from another and also determine antibiotic resistance. The new technique permits searches for multiple diseases and antibiotic resistance in about a day, compared to the several days required by earlier methods. According to an announcement, "they can detect as many as 557 genes, making it possible for them to screen for 40 different species of bacteria, 1,200 serotypes of *Salmonella*, five common serotypes of *E. coli*, and resistance to the 45 most common antibiotics used to treat human and animal illnesses caused by these pathogens."

Military Implications:

The military should follow this development to assess its application to systems for more rapidly performing medical services and scanning possibly contaminated environments.

Sources:

Rapid test for pathogens developed by K-State researchers

<http://www.physorg.com/news138592074.html%20KSU%20microarrays>

Researchers Developing Diagnostic 'Lab On A Chip'

<http://www.sciencedaily.com/releases/2007/08/070806160105.htm>

8.1.3 New Bacterium Can Provide Arsenic Cleanup and Possibly Detection

Thomas Osborne and Joanne Santini from University College, London presented a paper at the Society for General Microbiology's autumn meeting announcing the discovery, at Yellowknife NWT, Canada, of a bacterium which converts arsenic in water from arsenite to much more easily removable arsenate, even at very low temperatures. The researchers also hope that an enzyme enabling the development of an arsenic biosensor can be isolated from these new strains of bacteria. [See also *Arsenic-polluted Water Decontamination Using Sulphate* in November 2004 and *Transgenic Plants to Decontaminate the Environment* (removes arsenic from contaminated soil) in the October 2002 environmental security monthly reports.]

Military Implications:

The military should investigate this development for its applicability to bioweapon (those containing arsenic) destruction and to environmental cleanup and surveillance.

Sources:

Bacteria Found That Cleans Up Arsenic Contamination

<http://www.ens-newswire.com/ens/sep2008/2008-09-08-01.asp>

Researchers find cold-loving, arsenic-eating bacteria in Yellowknife gold mine

<http://canadianpress.google.com/article/ALeqM5hWVrCjSf09VceYbYMpwdLaetylBgg>

8.1.4 New Treatment Improves Congo Red Decontamination

K.P. Gopinath of the Dept. of Chemical Engineering, A.C. College of Technology, Anna University, Chennai, India, and colleagues reportedly have developed an improved technique for the degradation of the toxic pollutant Congo Red. The method uses sonolysis as pretreatment followed by biological treatment with *Bacillus* sp. Sonolysis is the breaking of chemical bonds with sound.

Military Implications:

The military should consider this technique for use in handling instances of industrial contamination of the environment with this toxic chemical.

Source:

Improved biodegradation of Congored by using Bacillus sp

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V24-4TCXGB9-2&_user=10&_coverDate=09%2F07%2F2008&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7b8acf1bfa93ce92353434722cbd4609

8.2 Increasing Energy Efficiency Technologies

8.2.1 Small Omnidirectional Wind Turbines Could Provide Remote Power

quietrevolution ltd. [sic] of London, England, has developed a wind turbine, which is silent, only 16' tall and 9' in diameter, and responds to wind from any direction. The manufacturer estimates its probable output on a typical site at 6000-10000 kWh per year, i.e., up to about 1 kW continuous equivalent. Further development is expected to greatly reduce its current cost of almost \$45,000 plus installation.

Military Implications:

The military should follow this development as improvements evolve, to assess the unit's applicability to the powering of military and environmental surveillance systems.

Sources:

quietrevolution Company

<http://www.quietrevolution.co.uk>

Tiny Turbines May Have a Bright Future

<http://www.spiegel.de/international/business/0,1518,575877,00.html>

8.2.2 New Materials Provide Improved Ultracapacitor Storage

Hao Zhang of the Research Institute of Chemical Defense in China is lead author of a paper in Nano Letters describing a new structure for ultracapacitor electrodes consisting of flower-shaped manganese oxide nanoparticles deposited on carbon nanotubes vertically grown on a tantalum-foil base. The authors report that the new arrangement delivers five times as much power as activated-carbon electrodes. Cost may be a problem with this technique. Also, Prof. Rod Ruoff of the University of Texas at Austin is working with graphene as an electrode material, and believes that it may double the storage capability of ultracapacitors. Jiyoung Oh and Mikhail "Mike" Kozlov at the Univ. of Texas at Dallas' NanoTech Institute are conducting similar work using sheets of single-walled carbon nanotubes embedded with the polymer polypyrrole.

Military Implications:

The military should follow the development of these materials for their possible use in energy storage systems to reduce their environmental footprints and improve performance.

Sources:

Growth of Manganese Oxide Nanoflowers on Vertically-Aligned Carbon Nanotube Arrays for High-Rate Electrochemical Capacitive Energy Storage

<http://pubs.acs.org/cgi-bin/abstract.cgi/nalefd/2008/8/i09/abs/nl800925j.html>

Breakthrough In Energy Storage: New Carbon Material Shows Promise Of Storing Large Quantities Of Renewable Electrical Energy

<http://www.sciencedaily.com/releases/2008/09/080916143910.htm>

Nanoflowers Improve Ultracapacitors. A novel design could boost energy storage

<http://www.technologyreview.com/Energy/21375>

Important Twist in Supercapacitor Research

<http://www.physorg.com/news141048611.html>

Item 9. Updates on Previously Identified Issues

9.1 Intergovernmental Forum on Chemical Safety becomes part of the International Conference on Chemicals Management

The Intergovernmental Forum on Chemical Safety will be integrated into the International Conference on Chemicals Management (ICCM) as an advisory body providing an open, transparent and inclusive forum for addressing new and emerging issues related to sound chemicals management. The decision was taken at the sixth session of the IFCS, held in Dakar, Senegal, September 15-19, 2008. The Forum also considered nanotechnology issues, decided to include manufactured nanomaterials on its agenda, and discussed (without reaching consensus) international transport of lead and cadmium via trade. [See also *Call for Global Ban on Lead-based Paints* in October 2007, *Call for Reinforcements to Chemical Safety* in September 2006, and other related items in previous environmental security scanning reports.]

Military Implications:

Since the Intergovernmental Forum on Chemical Safety moved under the ICCM, its decisions are more likely to become legally binding international agreements. The military should seek cooperation with the Forum to assess effectiveness of existing chemical safety-related regulations and eventually suggest new enforcement and/or safety issues, as well as remain informed of discussions that might generate future regulations impacting military activities.

Sources:

Intergovernmental Forum on Chemical Safety VI: Global Partnership in Chemical Safety Contributing to the 2020 Goal

<http://www.iisd.ca/chemical/ifcs6/>

Intergovernmental Forum on Chemical Safety—Forum VI

<http://www.who.int/ifcs/forums/six/en/index.html>

9.2 UN to Demand Israel Pay Lebanon Compensations for War Damages

The Lebanese newspaper Al-Akhbar reported that UN Secretary-General Ban Ki-moon will submit a motion to the Security Council requesting Israel to pay Lebanon nearly \$1 billion for environmental damages caused during the 2006 Second Lebanon War. The amount is based on a World Bank damage assessment including, *inter alia*, the cost of UN clean-up of the oil spill after Israel bombed a large refinery, but not related environmental damages. [See also *Report on Lebanon After-war Environmental Assessment* in February 2007, *Environmental Legacy of Hezbollah-Israeli War* in January 2007, and other related items in previous environmental security reports.]

Military Implications:

[Similar to previous on the same issue] The international community is still paying for environmental cleanups for past conflicts. It is likely that there will be growing pressure for increased precision of operations so as to decrease environmental impacts, updating laws that assign liability, and defining redress issues concerning environmental damages in war. [See also related items in *Conflict and Post-Conflict Environmental Security Issues* section of *Chapter 9.1 Emerging Environmental Security Issues* on the CD accompanying the *2008 State of the Future* report by the WFUNA Millennium Project]

Sources:

Report: UN to demand Israel pay Lebanon \$1 billion in reparations

<http://www.haaretz.com/hasen/spages/1018564.html>

UN chief urges Israel to pay Lebanon \$1 billion'

http://www.dailystar.com.lb/article.asp?edition_id=1&category_id=2&article_id=95797

9.3 Nuclear Security Addressable only Internationally

The head of the National Nuclear Security Administration, Thomas D'Agostino, said that the international community should agree on a common set of security standards to prevent the spread of WMD and terrorists or rogue nations acquiring sensitive materials. "Let me be clear when I say I believe the United States has a special responsibility in advancing nonproliferation and global security. But we should not and cannot do it alone," he said. One important player might be the World Institute for Nuclear Security. The Institute formally opened its doors on September 29, 2008 in Vienna, Austria.

Meantime, a new disarmament study, *Abolishing Nuclear Weapons*, by the International Institute for Strategic Studies, examines the steps needed for 'getting to zero' and criticizes leaders advocating nuclear disarmament while "none of these states has an employee, let alone an interagency group, tasked full-time with identifying what would be required to verifiably decommission all its nuclear weapons." [See also *Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction* in July-August 2008, and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on similar issues] Ongoing reviews of the status of current and potential weapons of mass destruction and weaponizable materials should include continued efforts to increase international opportunities for assisting in compliance and effectiveness of current and future regulations.

Sources:

International Agreement Needed on Nuclear Security Standards, NNSA Chief Says

http://www.nti.org/d_newswire/issues/2008/9/18/2DC031E3-0221-4F30-BFE0-14C4795EC6B1.html

Abolishing Nuclear Weapons

<http://www.iiss.org/publications/adelphi-papers/2008-adelphi-papers/abolishing-nuclear-weapons/>
Study Demands Commitment to Nuclear Disarmament

http://www.nti.org/d_newswire/issues/2008/9/18/E44A3825-D295-4E29-B20B-E25BFC484AB0.html

World Institute for Nuclear Security

http://www.nti.org/b_aboutnti/b7_WINS.html

9.4 Systems for Reducing Emissions Expanding

9.4.1 New Zealand Adopts Carbon Trading Scheme in 2009

The New Zealand Parliament passed the Climate Change (Emissions Trading and Renewable Preference) Bill that will set up the country's first emissions trading scheme to help meet the country's obligations under the Kyoto Protocol. The carbon credits system begins in 2009 and is set by sectors. All industries in a sector will effectively set limits on the amount of emitted greenhouse gas, with those who surpass their ceilings having to buy credits from emitters that produced emissions below their ceiling. The phases of sector inclusion are: forestry from 2008; transport by 2009; stationary energy, such as coal-fired power stations by 2010; and agricultural waste by 2013. Australia's carbon trading scheme is set to begin by 2010. [See also *Post-Kyoto Negotiations* section in the April 2008 environmental security report]

Military Implications:

[Similar to previous on related issue] Australia and New Zealand are the only countries outside the EU to adopt a carbon-trading regime. However, it is likely that the trend will continue under increasing pressure from environmental groups, and even political parties. The military should seek to use the most environment-friendly technologies in order to reduce its pollution and be prepared for eventual new regulations, wherever applicable.

Sources:

Climate Change (Emissions Trading and Renewable Preference) Bill

http://www.parliament.nz/en-NZ/PB/Legislation/Bills/c/0/4/00DBHOH_BILL8368_1-Climate-Change-Emissions-Trading-and-Renewable.htm

New Zealand Parliament Passes Carbon Trading Scheme

<http://www.planetark.com/dailynewsstory.cfm/newsid/50193/story.htm>

9.4.2 China Adopting Pollution Tax Systems

Reportedly China formed a team of experts from several government agencies to study whether to impose an environmental tax on polluters to encourage emissions cuts. Deputy Minister for Environmental Protection Pan Yue was quoted as saying that the team is also assessing issues of compensation for environmental damage and creation of a trading system for polluting gases. There are no details of the proposed tax or when it might be introduced. China already introduced taxes aimed at emission reductions: in 2007 it cut export tax rebates for energy-intensive products, and in September 2008 it raised consumption taxes on large passenger vehicles.

Military Implications:

[Similar to previous on related issue] It is likely that the trend of adopting pollution-reduction systems will expand under increasing pressure from environmental groups, and even political parties. The military should seek to use the most environment-friendly technologies in order to reduce its pollution and be prepared for eventual new regulations, wherever applicable.

Source:

China Mulls Green Tax to Curb Pollution – Report

<http://www.planetark.com/dailynewsstory.cfm/newsid/50226/story.htm>

9.5 Aviation and Shipping should be Subject to Emissions Cuts

The EU is proposing to include the shipping industry in the Emission Trading Scheme from 2013. However, climate scientists argue that, given the rapid growth of emissions from international aviation and shipping, it is not enough that they are included in the carbon-trading scheme, but they should be subject to emissions cuts regulations. [See also *Aviation to be included in the ETS from 2012* in July-August 2008, *Shipping to Face New Regulations to Reduce Air Pollution* in September 2007, and other related items in previous environmental security reports.]

Meantime, local actions are increasing. In California, a “clean trucks” program put in place by local port authorities will begin operating 1 October, when all pre-1989 diesel rigs will be barred from entering the Los Angeles and Long Beach waterfront marine terminals. The restrictions will continue incrementally through 1 January 2012, when only trucks meeting federal 2007 emission standards will be allowed in.

Military Implications:

[Same to previous on similar issue] It is likely that scientific assessments and increasing pressure from environmental groups, and even political parties, will trigger regulations on pollution generated by the shipping industry. The military should seek to use the most environment-friendly technologies in order to reduce its pollution and be prepared for eventual new regulations, wherever applicable.

Sources:

Aviation and shipping cannot trade away emissions, scientist warns

<http://www.guardian.co.uk/environment/2008/sep/24/carbonemissions.emissionstrading>

EU Lawmaker Demands Shipping Included in CO2 Caps

<http://www.planetark.com/dailynewsstory.cfm/newsid/50188/story.htm>

EU Lawmaker Warns CO2 Caps in Danger, Eyes Shipping

<http://www.planetark.com/dailynewsstory.cfm/newsid/50185/story.htm>

Ports gear up for Clean Trucks Program

http://www.dailybreeze.com/ci_10580651

9.6 Ozone Continues to Thin over Antarctica Casting Doubt on Success of the Montreal Protocol

The World Meteorological Organization estimates that the ozone hole over Antarctica this year is 8% larger than its peak in 2007 and it might take another 50 years to completely recover. Nevertheless, without the Montreal Protocol, the impact at the polar regions would have been more significant, shows the “world avoided” computer model, which considers only chlorine changes, all the other variables being constant. [See also *Call for Expanding Montreal Protocol on Ozone-Depleting Substances* in September 2007, and other similar items on this issue in previous environmental security reports.]

Military Implications:

The military and its contractors should increase efforts to reduce ozone-depleting substances and should prepare to comply with eventual new phase-outs.

Sources:

The world we avoided

<http://www.nature.com/news/2008/080905/full/news.2008.1081.html>

Ozone hole 8% larger this year, meteorologists say

<http://www.chron.com/disp/story.mpl/headline/nation/6004433.html>

The ozone hole of 2008 is larger than in 2007

http://www.wmo.int/pages/mediacentre/press_releases/pr_829_en.html

9.7 Arctic Needs New International Regulations

Legal experts participating to the Polar Law Symposium hosted by the United Nations University and the University of Akureyri in northern Iceland, September 7-9, 2008, concluded that a new legal framework is needed for the fragile and changing polar regions. They put forward a set of recommendations to governments, international bodies and other interested parties (to be distributed within six weeks of the event). “Many experts believe this new rush to the polar regions is not manageable within existing international law,” said A.H. Zakri, Director of the UNU Yokohama-based Institute of Advanced Studies, while Tatiana Saksina of the WWF expressed that “there should be new rules, stricter rules. We are proposing a new convention for the protection of the Arctic Ocean.”

Meantime, Russian President Medvedev re-launched military patrols in the Arctic waters and called on the security agency to establish a formal border in the region since it had “strategic importance” for Russia, while Gazprom announced the creation of a subsidiary company for the Arctic reserves exploration.

The economic benefits of an ice-free Arctic are also pushing the EU’s polar strategy up on the policy agenda, while a US-Canada expedition will explore the Arctic region, collecting data for mapping the Arctic seafloor and studying the geology of the sub-seafloor to build the case for the two countries’ rights. [See also *The Debate over Strategic Control of the Arctic is Heating Up* in July-August 2008, and other related items in previous environmental security reports.]

Military Implications:

[Similar to previous on the same issue] Relevant military personnel should contact the UNU to get a copy of the report to identify any new military roles in the region.

Sources:

International Symposium: Looking beyond the International Polar Year. Emerging and re-emerging issues in international law and policy in the Polar Regions

http://www.ias.unu.edu/sub_page.aspx?catID=8&ddlID=620

Thaw Of Polar Regions May Need New UN Laws – Experts

<http://www.planetark.org/dailynewsstory.cfm/newsid/50115/story.htm>

President Medvedev threatens Russian Arctic annexation

<http://www.timesonline.co.uk/tol/news/world/europe/article4773567.ece>

Russia to cement claim over resource-rich Arctic

<http://www.neurope.eu/articles/89848.php>

Unexplored Arctic region to be mapped

<http://www.physorg.com/news139663090.html>

Melting ice cap pushes Arctic up EU agenda

<http://euobserver.com/9/26723/?rk=1>

9.8 Increased Use of Space Technology for Monitoring Environmental Events

Kopernikus is the new name of the European joint earth observation system GMES (Global Monitoring for Environment and Security). In addition to monitoring environmental events,

Kopernikus will enhance people's safety by providing early warnings of natural disasters and a basis of enhanced modeling activities to help better understand the drivers of climate change. The EU 5th Space Council adopted a Resolution on the priorities of Galileo and Kopernikus programs, while the Space Council highlighted the need to improve the coordination between civil and defense programs, and noted the intention of ESA's Director General to submit a proposal for a program on Space Situational Awareness to set the basis towards the development of a European capability for monitoring European space infrastructure and of space debris.

Chinese officials say they have launched their first two natural disaster and environment monitoring satellites.

A report by the U.S. Climate Change Science Program concluded that the utilization of Earth science information to manage resources and protect public health should improve. [See also *Space Technology for Improving Planetary Knowledge and Security* in April 2006, and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on similar issues] Further developing an integrating environmental monitoring capability to provide informed data to the public, and policy- and decision-makers, would considerably improve the assessment of potential environmental impacts of different actions, facilitate enforcement of international treaties worldwide, and could help mitigate environmental and social consequences induced by conflicts or natural disasters. The military should consider full cooperation in all the phases—from development to implementation and use of international space-based observation systems.

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Kopernikus - Europe's eye in the sky

<http://www.norwaypost.no/cgi-bin/norwaypost/imaker?id=194211>

Forum GMES 2008

<http://www.forumgmes2008.eu>

Ministers meet to take forward the European Space Policy

http://www.esa.int/esaCP/SEMW506EJLF_index_0.html

China launches natural disaster monitoring satellites

http://news.xinhuanet.com/english/2008-09/06/content_9806611.htm

Report Explores Use Of Earth Data To Support National Priorities

http://www.spacemart.com/reports/Report_Explores_Use_Of_Earth_Data_To_Support_National_Priorities_999.html

9.9 Climate Change

9.9.1 Scientific Evidence and Natural Disasters

The four tropical storms, Fay, Gustav, Hanna and Ike, destroyed all of Haiti's harvest, killed at least 328 people, and left some 800,000 people—about 10% of the population—in need of emergency assistance. Cuba, struck by hurricanes Gustav and Ike also suffered what the government described as the worst damage in the island's history. In India, the unusually strong monsoon caused enormous flooding, with an estimated 3 million people in need of assistance “such that only the Army can handle it,” said Parshuram Rai, director, Centre for Environment and Food Security (CEFS) in New Delhi.

Meantime, in the arid Somali Region of Ethiopia it has not rained for three years, and the Horn of Africa is facing a humanitarian crisis, with 17 million people, including 3 million children, in urgent need of food and other critical assistance.

Australia's national science agency, the Commonwealth Scientific and Industrial Research Organization, warned that the country should prepare a network of long-term coastal observation sites to improve large wave understanding and increase preparedness for more severe and frequent storms.

9.9.2 Food and Water Security

The World Bank warns that the global food crises will be long-term as climate change, energy, and water scarcity intensify. In Africa, 100 million people are at risk of moving back into poverty. The International Water Management Institute (IWMI) argues that the world is facing not so much a food crisis as a water crisis, which might intensify, as water is likely to get scarcer due to global warming and increased demand.

9.9.3 Migration

Worldwatch Institute estimates that roughly one in every 36 people worldwide is moving involuntarily and warns that, as the trend increases, the international community is facing special challenges. Climate change will increase the ranks of "environmental refugees," especially of the 600 million people living in low-lying areas. A research team from the School of Oceanographic Studies at the Jadavpur University, Kolkata, India, estimate that out of the 4.1 million people living in the Sunderbans, the largest delta region in the world, 70,000 would become 'environmental refugees,' by 2020. The initial land given to relocated people was decreased and is causing discontent. The rate of sea level rise is currently approaching 3.14 mm per year near Sagar Island and this could increase to 3.5 mm in the next few years due to global warming.

9.9.4 Melting Glaciers and Sea Ice

The Northwest Passage has been ice-free since early August for the second year in a row and it's the first year that both the Northwest Passage over the top of North America and Russia's Northeast Passage are free of ice. Although the ice is the second lowest (after last year's record), the US National Snow and Ice Data Center (NSIDC) says "some climate modelers expect to see nothing but open water within five years." This is corroborated by Canadian scientists who report that Canada's Arctic ice shelves are disappearing at an incredibly high rate. The greatest changes are occurring at the highest northern latitudes; this summer alone, five ice shelves along the northern Ellesmere Island had shrunk by 23%.

The report *Global Glacier Changes: Facts and Figures* by UNEP and the World Glacier Monitoring Service is a comprehensive analysis of the fluctuations of glaciers and ice caps worldwide and presents the overall trend of glaciers' retreat. The report underlines that while excellent data exist for Europe and North America, monitoring should urgently improve for "some strategically important regions" as the Tropics, Central Asia and the Polar Regions, where data gaps undermine the ability to provide early warning and plan preparedness accordingly.

According to initial calculations, Greenland has lost 150 billion tons of ice a year in the last four years. The Danish-American project GNET is part of a scientific observation network for monitoring and providing estimates on Greenland's ice cap melting rate.

A Spanish research study has revealed that Pyrenean glaciers might disappear by 2050. Glaciological calculations have shown that since 1990 rapid melting has caused total regression of the smallest glaciers and 50%-60% of the surface area of the largest glaciers.

Satellite images revealed that the Karakoram-Himalayan glaciers have been retreating at around 110 meters a year over the period 1978 to 2006 compared to the 30 to 34 meters previously reported. Among human activities that have caused the retreat are listed intense military activities at the Siachen Glacier region, along with dumping of chemical and human waste. The Karakoram-Himalayan glaciers are headwaters for Asia's nine largest rivers, including the Indus, Ganges, Mekong, Yangtze and Yellow rivers.

9.9.5 Rising Sea Levels

A study commissioned by the Dutch government recommends that the Netherlands should spend "an extra 1 to 1.5 billion euros per year" to 2100 (representing about 0.3% of the national income) since "The security challenge is urgent: the climate is changing, the sea level rising and river flows increasing while a quarter of dikes and dams do not meet the current safety norms." The report predicts a sea level rise of between 0.65 and 1.3 meters (2.15 and 4.3 feet) by 2100 and up to four meters by 2200.

A team of US scientists concluded that it is very unlikely that sea levels would rise by more than 2m (7ft) by 2100, even if one factored in faster melting and flow of Greenland and Antarctic ice sheets and glaciers. However, paleoclimatologists at the University of Wisconsin-Madison, analyzing the prehistoric Laurentide ice sheet (today's Greenland is an analog of those earlier climatic conditions) say that Greenland could melt faster than estimated based on contemporary trends, raising sea levels 1.3 meters by 2100.

The representatives of four Pacific island nations—Kiribati, the Marshall Islands, Palau, and Micronesia—called on delegates at the General Assembly's annual high-level debate to increase help and adaptation actions. Kiribati's President Anote Tong noted that his country has only several decades before the country's islands become uninhabitable. Tonga's Prime Minister Feleti Vaka'uta Sevele underlined that "climate refugees from some of the Pacific Island Forum countries is no longer a prospect but a reality, with relocations of communities due to sea level rise already taking place."

Cities along the West coast of Africa from Mauritania to Cameroon will be underwater as a result of rising sea levels by the end of the century, environmental experts say. A separate report from South Africa says Cape Town has a one in five chance of severe flooding within 25 years as a result of global warming.

9.9.6 Post-Kyoto Negotiations

The *Climate Change Review* by Professor Ross Garnaut, commissioned by Australia's government, assesses what should be targets for cutting CO₂ emissions by the greatest emitting countries to respond to climate change. The report recommends the following targets: for Australia 80% for 2050 with a 10% interim by 2020; same for Canada; for the U.S. 81%, for Japan 75%, and the EU 69%. If considering emissions per capita, China should cut only 4%. The Australian Federal Treasury will release its emissions trading scheme economic model in October, while emissions trading legislation is expected to be introduced by the end of the year.

Military Implications:

[Same as previous on similar issues] Increasingly more compelling evidence and warnings on climate change amplify international discourse and increase the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects. Hence, the military should be doing its part in reducing greenhouse gas emissions and preparing to help mitigate the human-made and natural catastrophes that could ensue.

Sources: (see a more expanded list in the [Appendix](#))

UN appeals for over \$100 million to aid Haiti storm-stricken survivors

<http://www.un.org/apps/news/story.asp?NewsID=27996&Cr=Haiti&Cr1=Storm>

Cuba suffered what the government described as the worst damage in the island's history after being struck by hurricanes Gustav and Ike.

http://www.economist.com/displaystory.cfm?story_id=12262213&fsrc=nwl

Flooding in India: Why wasn't the government ready?

<http://www.csmonitor.com/2008/0905/p04s01-wosc.html>

Africa's "silent famine" deepens

<http://tvnz.co.nz/view/page/536641/2055472>

Running dry. *The Economist*, Sep 18th 2008

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War zone's melting glacier a 'colossal' risk

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Dutch government warned against rising sea levels

<http://www.terraldaily.com/2007/080903152846.60bx5glo.html>

General Debate of the 63rd Session (23 September - 1 October 2008)

<http://www.un.org/ga/63/generaldebate/>

WEST AFRICA: Coastline to be submerged by 2099

<http://www.irinnews.org/Report.aspx?ReportId=79986>

Garnaut Climate Change Review

<http://www.garnautreview.org.au/>

9.10 Nanotechnology Safety Issues

9.10.1 Survey of Nanotube Toxicity to Immune Systems

A recent paper reviews some existing studies assessing carbon nanotubes' toxicity to immune systems and provides the potential mechanistic explanation.

9.10.2 International Environmental Nanotechnology Conference 2008

The 2008 International Environmental Nanotechnology Conference: Applications and Implications will be held 7-9 October in Chicago IL. According to the announcement, "The conference will bring together researchers and practitioners from around the world to discuss the nanotechnology applications for remediation of environmental contaminants; the implications of

releasing manufactured nanoparticles into the environment, and pollution control and nano-enabled sensing.”

Military Implications:

[Same as previous on this issue] Military personnel concerned with nanotech issues should contribute their views to these activities. Also, relevant military personnel should review the information generated by such activities to improve military and contractor practices, as well as to assist and cooperate with the organizations working on those issues for enriching their studies.

Sources:

Exploring the Immunotoxicity of Carbon Nanotubes

<http://www.springerlink.com/content/g4u1716412126840/>

International Environmental Nanotechnology Conference: Applications and Implications

<http://emsus.com/nanotechconf/index.htm>

Item 10. Reports and Information Suggested for Review

10.1 Environmental Considerations Should be Included in Planning Military Operations

“Green Warriors. Army Environmental Considerations for Contingency Operations from Planning Through Post-Conflict” by RAND Corporation Arroyo Center, is a comprehensive analysis of the environmental aspects in military operations. It shows that considering environmental factors in military actions gives strategic advantages in combat and post-conflict operations, increasing the overall missions’ success. Environmental conditions impact troops’ health, safety and security and affect diplomatic relations and local populations’ and neighboring countries’ confidence in the operation. However, the study finds that the Army doesn’t have a comprehensive approach to environmental considerations at any phase, or in contracting. The recommendations are: “1. Improve the policy and guidance for environmental considerations in contingency operations. 2. Encourage an environmental ethic throughout the Army that extends to contingency operations. 3. Better incorporate environmental considerations into planning. 4. Improve pre-deployment and field environmental training. 5. Invest more in environmental resources and good environmental practices for field operations. 6. Use a ‘sustainability’ model for contingency operations.” Although specifically analyzing the Army, the results apply to any actors involved in contingency operations.

Military Implications:

The report’s findings and recommendations are consistent with the AEPI’s *Army Strategy for the Environment*, and therefore could be used to further improve military missions at national and international levels. Additionally, Appendix A “Domestic and International Law in Army Contingency Operations” is an outstanding analysis of environmental regulations—conventional and customary—pertinent to military actions.

Sources:

Green Warriors. Army Environmental Considerations for Contingency Operations from Planning Through Post-Conflict

<http://www.rand.org/pubs/monographs/MG632/>

Downloadable PDF: http://www.rand.org/pubs/monographs/2008/RAND_MG632.pdf

10.2 International Nuclear Safety Regime Review

“A Guide to Global Nuclear Governance: Safety, Security and Nonproliferation” is a review of international agreements and bodies addressing nuclear safety and security issues around the world. The report was prepared by the Canadian Centre for International Governance Innovation and is intended to be followed next year by a report of recommendations to improve international monitoring of nuclear material and combat proliferation.

Military Implications:

Relevant military personnel should study the guide for international nuclear security-related issues, and arrange to have the copies of the follows year’s report delivered for study.

Sources:

CIGI Publishes First-Of-Its-Kind Nuclear Guide

http://pr-usa.net/index.php?option=com_content&task=view&id=130760&Itemid=30

A Guide to Global Nuclear Governance: Safety, Security and Nonproliferation

http://www.igloo.org/cigi/download-nocache/Publications/research/nucleare/testa/global_nuc

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 7 Conference on Resilience Concepts for Large-Scale Disasters

**2008 U.S. Resilience Summit
Rapid Humanitarian Assistance and Disaster Management
Associated with
Large-scale Social Crisis and Global Change**

October 23, 2008
Cosmos Club
Washington, DC

For several decades, top U.S. and international scientists have been tracking global trends indicating potential challenges emerging in the early to mid-21st Century to the sustainable security of the United States and its broader community of nations. From the earliest models focusing on these issues, such as econometric models and world simulations stemming from Forrester's work at MIT, the implications for the health and well-being of U.S. citizens and the populous of other nations, looked potentially dire in the 2030 to 2040 time frame. Models indicated probable systems crashes in the U.S. and around the world, during the first half of the 21st Century, with massive human die-offs in the United States and around the world following collapses in biodiversity – if key trends were not reversed. Unfortunately, the trends of the past 30 years have validated, rather than disproved, many of the threats and vulnerabilities associated with emerging large-scale social crises linked to systemic global changes in these models and simulations.

Projections from the World3 model and other global change simulations in the late 20th Century, which considered most known global physical inputs, such as exponential population expansion, rapid increase in use of hydrocarbon fuels and other non-renewable resources and over-filling environmental sinks, (only one of which is carbon dioxide in the atmosphere – leading to now well-recognized human-induced climate change), indicated the impact of these global changes would begin to be obvious to citizens as well as political leaders in the first decade of the 21st Century. It was projected in the 1970s that irrefutable evidence of the risks and vulnerabilities associated with global changes would show up in the early 21st Century as increases in severe storms, massive food shortages, climate change, and concerns over the environmental consequences and availability of economically viable “fossil fuels.” The rapid increase in financial claims challenging the economic viability of the insurance industry and other businesses are only one of many data sources. However, the insurance industry's negative economic forecasts since the early 21st Century, now seems to be penetrating the reticence of business and governmental leaders to face questions of the viability of U.S. institutions in light of the increased probability of large-scale adverse events.

For those who debate honestly whether human activities are to blame for rapid global changes, and whether ecological carrying capacities are being over-extended, one thing is certain -- the increasing probability and severity of natural disasters, human-induced events, and other catastrophic events potentially impacting the sustainable security of the United States and its communities of allied nations can no longer be ignored. The risks and vulnerabilities stemming from adverse events leading to social crises (such as September 11, 2001, the anthrax attacks by rogue members of the U.S. bioweapons industry, the Indian Ocean Basin tsunami, the Hurricane Katrina disaster, the increasing threat of a pandemic, and the current and emerging international food and water crises) are accelerating at a rate that now requires new systems. These new systems acknowledge and address these factors amongst other strategic threats to the United States and its allies. Even with the evidence of global changes, the National Security Council and many U.S. agencies have yet to implement innovations sufficient to face the increasing frequency and severity of complex disasters, emerging social crises and global changes that threaten systems essential to the stability of the U.S. and the broader community of nations.

The U.S. Resilience Summit 2008, focusing on Rapid Humanitarian Assistance and Disaster Management, will bring together (under Chatham House rules) top U.S. and world leaders in emerging rapid response systems, capable of addressing large-scale systems discontinuities associated with social crisis and global change, which could threaten the sustainable security of the United States and its allies. On October 23, 2008, these leaders will convene at the Cosmos Club in Washington D.C. to review new systems capabilities resonant with the U.S. Defense Department's and other next generation strategic security management paradigms, such as FAC (Focus, Agility, and Convergence), augmenting the limitations of older, less responsive, command and control systems. In addition, the DODs' and other U.S. agencies' new doctrines regarding the prevention and management of large-scale social crises (including war, but primarily focusing on complex operations other than war), impacting rapid humanitarian assistance and disaster management, will be discussed and critiqued. Members of both U.S. Presidential candidates' (McCain and Obama) transition teams addressing issues of national security, humanitarian assistance, and disaster management are being invited to the Summit, along with key thought leaders building and testing new FAC systems pertinent to an experimental multi-agency unit proposed to be headed up by a small team at the National Security Council.

Thinking back from a hypothetical event occurring on March 9th, 2009, the Summit participants will identify mission critical gaps and planning objectives. They will be exposed to attributes of a FAC system engaging rapid humanitarian assistance and disaster management intelligent social networks with the capability of organizing 10,000 key experts in a non-hierarchical, non-controlled system addressing mission critical gaps in crises potentially threatening the interests of the United States and the broader community of nations. Starting the week of September 22, 2008, catalytic seed articles will be posted on the DKMS (Disaster Knowledge Management System) to enable discourse leading up to the Summit. During November and December 2008, the President-elect's transition team will be invited to review the recommendations of the October 2008 U.S. Resilience Summit before the Summit Report is released in late January during a public event in Washington D.C.

The question now is not if actions can be made, or should be made, by the U.S. to become less impacted by current and emerging global changes. The focus now is on the specific tools and methodologies that enable the U.S. and allied nations to immediately engage and test nascent FAC systems during exercises and emergent real world events, in order to grow resilient network capabilities sufficient to anticipate, prevent, and manage emergent risks and vulnerabilities threatening U.S. interests at home and abroad.

It is time to increase the resilience of U.S. institutions, the American public, and their communities. Not only for the health and well-being of Americans, and their communities and institutions, but also in a way that reduces risks and vulnerabilities for people and their communities around the world. The international community can benefit from the leadership of the United States on issues of sustainability and resilience. Given that other nations and their publics will share responsibility in addressing emerging global changes and associated social crises, the architectures of these systems will greatly benefit from emerging open source approaches that will be made available to vulnerable communities worldwide through U.S. and international institutions.

Operational systems enabling key U.S. decision-makers to competently address large-scale social crises and global change will immediately benefit the next U.S. Presidential Administration, independent of political party affiliation. Demonstrating awareness of and competence in systems that address the potential threats associated with global change and large-scale social crises will require bipartisan collaboration. The next Administration, by engaging these new FAC systems at the National Security Council (with appropriate links to A teams in the White House and key agencies and institutions throughout American society as well as associated institutions). Through emerging FAC-based systems, rapid humanitarian assistance and disaster management capabilities (that have emerged during the past decade) can, through collaborative initiatives, reach a level of operational importance during 2009. Key thought leaders and operational experts from around the United States and around the world are being engaged through the Resilience Summits in 2008 and 2009 to coalesce and expand these capabilities.

In engaging new tools and methodologies improving resilience, the next U.S. President's Administration can demonstrate its early and aggressive position of leadership on national security issues, including some of the large-scale complex, and sometimes seemingly intractable, problems now worrying the American public and humanity worldwide regarding potential social crises and global change. The success of the new Administration will depend upon adopting new approaches that the American public and U.S. allies perceive as competently addressing emerging social crises and global change threatening the security of the United States and the world community. The October 2008 Resilience Summit will provide mechanisms for optimizing the adoption of viable initiatives at the White House and the National Security Council level regarding the effective application of next generation tools and methodologies enabling the prevention and management of large-scale social crises and global change issues.

For more information, contact Dr. Michael McDonald at: Michael.D.McDonald@mac.com

7.9 Climate Change

Sources: (a more expanded list)

UN appeals for over \$100 million to aid Haiti storm-stricken survivors

<http://www.un.org/apps/news/story.asp?NewsID=27996&Cr=Haiti&Cr1=Storm>

Flooded Haitians 'in dire need'

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Cuba suffered what the government described as the worst damage in the island's history after being struck by hurricanes Gustav and Ike.

http://www.economist.com/displaystory.cfm?story_id=12262213&fsrc=nwl

Please send ice

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UN agency seeks \$460 million to feed Ethiopians hit by drought, high food prices

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Australia Being Hit by More "Extreme Waves" – Study

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Melting Ice Brings Competition for Resources

<http://www.spiegel.de/international/world/0,1518,579265-3,00.html>

No 2008 record for Arctic sea ice

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Ellesmere Island loses huge ice shelf

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The glaciers in the Pyrenees will disappear in less than 50 years

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Sea level rise by 2100 'below 2m'

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Greenland's ancient analogue

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Rapid early Holocene deglaciation of the Laurentide ice sheet

<http://www.nature.com/ngeo/journal/v1/n9/abs/ngeo285.html> (abstract; full text by subscription)

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WEST AFRICA: Coastline to be submerged by 2099

<http://www.irinnews.org/Report.aspx?ReportId=79986>

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Ross Garnaut's nuclear knockout

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